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Fish Stocking Assessment Of Heather Lake, 1998

R. J. Zemlak
April 1999

PWFWCP Report No. 195

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: R. J. Zemlak. April 1999. Fish stocking assessment of Heather Lake, 1998. Peace/Williston Fish and Wildlife Compensation Program, Report No. 195. 15pp plus appendices.

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HEATHER LAKE

WATERSHED:	Parsnip River
DATE OF SURVEY:	July 6,7. 9, and 10 1998
FIELD CREW LEADER:	Randy J. Zemlak
FIELD ASSISSTANT:	Arne R. Langston

PEACE/WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

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FISH AND WILDLIFE BRANCH

REPORT PREPARED BY: RANDY J. ZEMLAK

INTRODUCTION

Heather Lake is located near Mackenzie BC (Figure 1). The lake has received significant attention over the past 28 years from fish biologists with both the Ministry of Environment, Lands and Parks (MELP) and the Peace/Williston Fish and Wildlife Compensation Program (PWFWCP). Rainbow trout have been stocked discontinuously in Heather Lake since 1979. The first informal survey conducted on Heather Lake was by MELP in 1970 (Bustard and Jansson 1970). Some information was then collected for Heather Lake in May of 1976 (on file at MELP). In October 1984, the lake was surveyed by B. Little (MELP), and the data is also on file at the MELP office. During June of 1989, PWFWCP fish biologists conducted a more thorough survey of the lake (McLean 1989). In August 1990, PWFWCP fish technician Duane Jesson developed an executive summary of potential and realized enhancements projects for 14 lakes in the Williston watershed, one of which was Heather Lake (Jesson 1990). All of the above reports can be viewed at the PWFWCP office (address on cover page).

In 1998, Heather Lake was targeted as a high priority for a fish stocking evaluation as part of the PWFWCP stock assessment program for the Omineca Region. During July 1998, PWFWCP fish biologists investigated Heather Lake primarily to evaluate the success of the current fish stocking program.

LAKE LOCATION

Location:	20 km north/northwest of Mackenzie BC
Elevation:	± 693 m
Latitude/Longitude:	55° 30' 00" : 123° 15' 11"
U.T.M.:	10.483454.6149949 (NAD 1983)
Management Unit:	7-30
N.T.S. Map No.:	93 - O/6 and 93 - O11l
Waterbody Identifier:	00394PARA
Lake Drainage:	Outlet Cr. —> Williston Reservoir —> Peace R.

ACCESS

Although access to Heather Lake has not changed significantly since the reconnaissance level lake inventory (1989), exact road directions and conditions have changed over time. From the Alexander Mackenzie Hotel in Mackenzie (0.0 km), drive north on the Mackenzie Boulevard/Finlay Forks Forest Service Road. At 0.4 km, drive straight through the four-way intersection. At 7.5 km, the road changes from a two lane paved road to a two-

Figure 1. Location of Heather Lake.

lane gravel (2wd) road. At 8.4 km, cross Morfee Creek bridge. At 9.5 km, there is a four-way intersection. Stay straight on the Parsnip West Forest Service Road. At 10.0 km, cross the Mugaha Creek bridge. At 10.4 km, stay right at this three-way intersection. At 15.8 km, cross Tutu Creek bridge. At 19.7 km, go straight, do not go right on the Tony Creek M.L. road. At 20.4 km, cross Tony Creek bridge. At 21.8 km, turn left onto Heather Lake access road (single lane, gravel road, 2wd). Drive another 0.5 km to the car top boat launch.

STOCKING HISTORY

Rainbow Trout

Heather Lake was initially stocked with 20,000 rainbow trout in 1979 and received intermittent releases until 1992 (Table 1). From this time forward, stocking numbers have been relatively consistent with an average of 5,000 yearlings stocked every year between 1992 and 1993, and have then increased to 10,000 fish stocked from 1994 to 1998. Three types of stocks have been introduced: Premier, Blackwater, and Dragon. Of these three strains, about 105,000 rainbow trout have been stocked into Heather Lake during a 20-year period. The average size for the Premier stocked fish have been about 4.7 g while the average size of the Blackwater strain of fish have been larger at approximately 20.6 g.

Table 1. Heather Lake rainbow trout stocking history.

Year	Number	Size (g)	Life Stage	Stock
1979	20,000	3.4	Unknown	NRT Premier
1981	10,000	5.7	Unknown	NRT Premier
1983	10,000	4.0	Unknown	NRT Premier
1984	5,000	7.3	Unknown	NRT Premier
1992	5,000	6.6	Yearling	NRT Premier
1993	5,000	19.6	Yearling	Blackwater
1994	10,000	17.5	Yearling	Blackwater
1995	10,000	27.5	Yearling	Blackwater/Dragon
1996	10,000	24.5	Yearling	Blackwater/Dragon
1997	10,000	10.4	Yearling	Blackwater
1998	10,000	23.7	Yearling	Blackwater/Dragon

Earlier stocking efforts focused on stocking a "Premier" strain of rainbow trout. The 1984 stock assessment indicated that these Premier rainbow trout were not doing well in Heather Lake. By 1990, it was recommended to stock the lake with larger sized rainbow trout or to stock a different type of strain (i.e.

Blackwater). The Blackwater strain has a history of doing well in a coarse fish environment, which is applicable to Heather Lake. As a result, in 1993, Heather Lake was then stocked with the Blackwater and Dragon strains. Since this time, Heather Lake has not been assessed to see if the Blackwater strain has been able to populate the lake more successfully than previous stocking efforts.

METHODS

Heather Lake's rainbow trout stocking program was assessed in July 1998 by fish biologists from the PWFWCP. Two different techniques were used to determine relative abundance of fish species in Heather Lake: gill nets and Gee traps. Conversations with MELP fish biologists prior to the gill netting effort suggested that it would be valuable to have at least 10 fish sampled from each age group to accurately provide future recommendations to the stocking program. If this amount of fish were not obtainable, then it was recommended to have at least 30 sampled fish from the population, but more would be preferable. Therefore, it was deemed necessary to keep the nets in the water overnight. One sinking monofilament experimental gill net was set overnight on July 6 and was set again in a different location on July 9. The net consisted of six different sized mesh panels ranging from 25 to 85 mm. Each panel is 15.24 m long and 2.4 m wide. The first gill net effort was set in the same location as in the 1989 survey in order to compare the catches between years. The second method used was Gee traps. Each Gee trap (three in total) was baited with sardines and set overnight. The Gee traps were set in shallow (< 2 m) littoral habitat in the same locations as the 1989 survey.

The rainbow trout captured were measured for fork length and weight. A biological examination of the fish was conducted which revealed its sex, maturity, stomach contents, and disease/parasite presence. Scale samples were collected for age determination and analysis was performed by North/South Consultants (Winnipeg, Manitoba). General appearance of the fish was determined through visual analysis.

All other fish species were enumerated, and most fish were sampled for fork length and weight. General appearance of these fish were examined and recorded. Some fish were examined for stomach content and sexual maturity. Disease presence was determined by visual observation. Any non-game fish captured that were still alive in the gill nets were released immediately. All fish captured in the Gee traps were released after sampling. Photos of some fish were taken.

The Mackenzie Fish and Game Association holds an annual coarse fishing derby on Heather Lake. The derby was scheduled for mid-July. The

PWFWCP fish biologists were interested to see how many coarse fish were captured in Heather Lake to get an indication of the competition the stocked rainbow trout may be up against. Therefore, data sheets were provided to the Fishing Derby Coordinator and he was instructed to record the fork length and weight of each coarse fish captured.

The habitat features of Heather Lake were briefly assessed. The entire perimeter of the lake was observed for any new possible inlets. The main inlet stream from Dina Lake #4 and the outlet stream were assessed for salmonid spawning potential. In addition, photo documentation of the two islands were taken as indicated by the original bathymetric map (Jansson 1970). The benchmark set during the original study (1970) was explored. Changes to the current water level was measured with an Abney level, 1.5 m staff, and a 30 m Eslon tape (reference to the high water mark). Any new campsites developed after the original survey in 1970 were also recorded. Photo documentation was taken of the lake.

RESULTS

Gill Nets

One overnight net set on July 6, 1998 (Figure 2) yielded many different fish species, but very few rainbow trout. This gill net, set for 22.0 hours overnight (Appendix 1), produced in order of abundance: 73 northern pikeminnows (northern squawfish, NSC), 22 white suckers (WSU), 15 mountain whitefish (MW), 14 peamouth chub (PCC), 12 longnose suckers (LSU), 9 lake whitefish (LW), 7 rainbow trout (RB), 1 bull trout (BT), and 1 redside shiner (RSC), (Table 2).

The weather during July was quite warm and it appeared at that time the rainbow trout could inhabit deeper water (out of reach of the gill net), where the water temperature would be much cooler than near the surface. As a result, with the very low numbers of rainbow trout captured, it was deemed necessary to conduct a subsequent gill netting effort to set the net in deeper (> 12 m) water.

On July 9 1998, a second gill netting effort was conducted on Heather Lake. One gill net was set overnight. The gill net was set off of the north shore of the west island for 15.5 hours (Appendix 1). This net produced, in order of abundance: 44 northern pikeminnows, 16 white suckers, 8 longnose suckers, 4 redside shiners, 3 lake whitefish, 3 peamouth chub, and 1 rainbow trout (Table 2). This gill net reached a depth of 23.1 m.

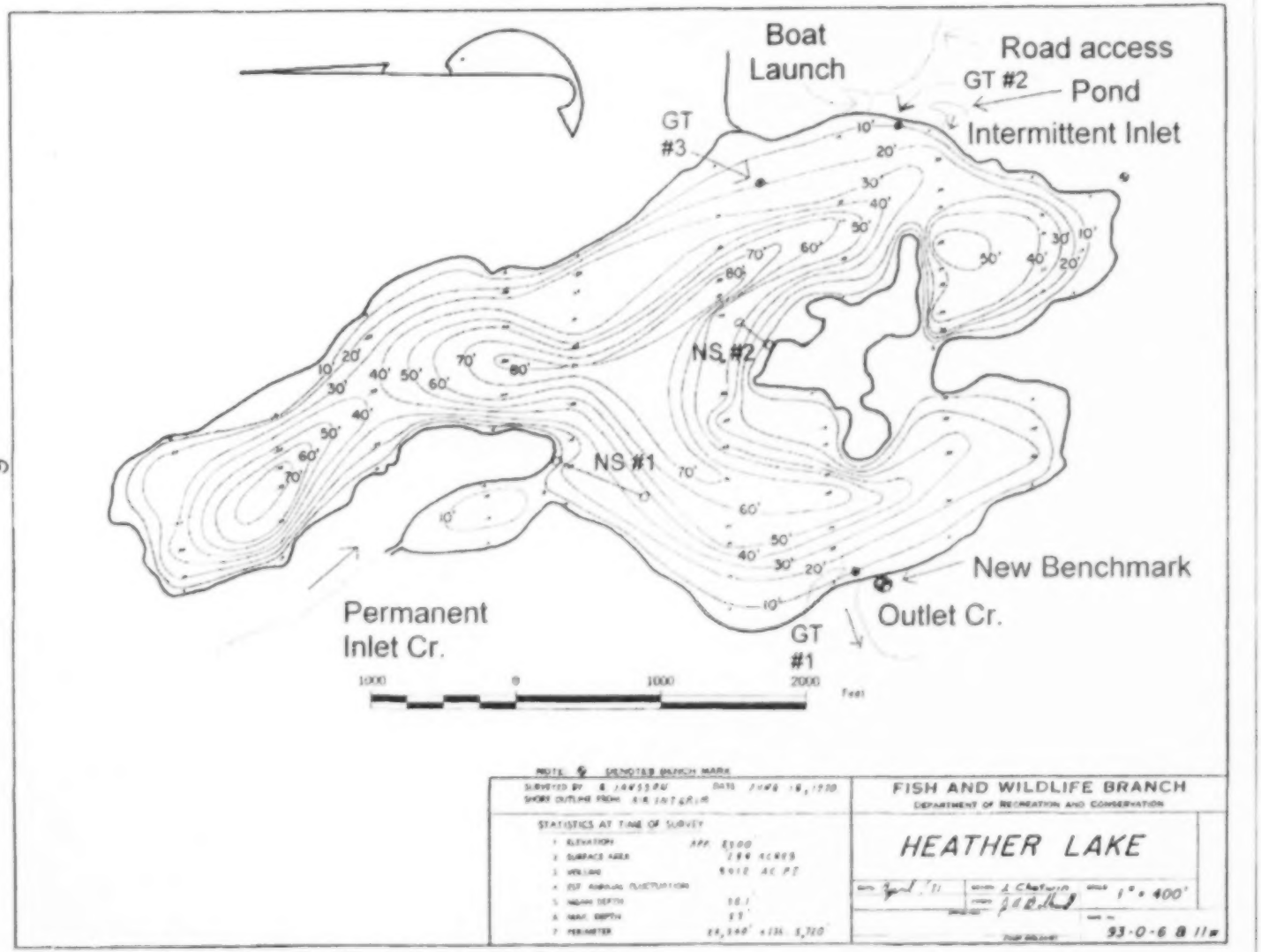

Figure 2. Location of gill net sets and Gee traps.

Table 2. Gill net catch summary for Heather Lake, 1998.

Date	Species	Net Site 1	Net Site 2	Total	Number Sampled	Number Preserved	Size Range (cm)
July 7	NSC	73	n/a	73	73	0	11.5 - 40.6
July 7	WSU	22	n/a	22	22	0	31.9 - 40.4
July 7	MW	15	n/a	15	15	0	26.8 - 41.9
July 7	PCC	14	n/a	14	14	0	10.5 - 28.5
July 7	LSU	12	n/a	12	12	0	29.6 - 38.0
July 7	LW	9	n/a	9	9	0	27.1 - 31.0
July 7	RB	7	n/a	7	7	0	24.2 - 37.1
July 7	BT	1	n/a	1	1	0	38.2
July 7	RSC	1	n/a	1	1	0	9.5
July 10	NSC	n/a	44	44	44	0	12.3 - 36.7
July 10	WSU	n/a	16	16	16	0	32.4 - 40.5
July 10	LSU	n/a	8	8	8	0	32.6 - 40.0
July 10	RSC	n/a	4	4	4	0	10.2 - 11.7
July 10	LW	n/a	3	3	3	0	28.2 - 29.9
July 10	PCC	n/a	3	3	3	0	12.2 - 16.4
July 10	RB	n/a	1	1	1	0	14.5

The most abundant species captured was northern pikeminnow. Almost all of these fish species were captured in the 25 mm sized mesh (130 mm avg. fork length). Only four other fish (34.5 - 40.6 cm fork length) were captured in the larger mesh sized panels.

Age determination for all rainbow trout (n = 5) was determined by North/South Consultants (Appendix 2). Prints of the scales and age markings were provided for each fish, and reviewed by PWFWCP fish biologists. No obvious errors were detected. One scale was unable to read. Only ages 3 and 4 rainbow trout were captured in Heather Lake.

Coarse Fishing Derby

The coarse fishing derby on Heather Lake was held on July 11 and 12, 1998. The goal of this derby is to try and catch as many fish as possible. The winner was determined by having the highest total weight between all coarse fish captured. Therefore, all fish, big or small, contributed to a person's overall catch. Approximately 100 participants entered the derby. During the two-day period, 256 kg of coarse fish were captured. These fish were mostly comprised of northern pikeminnows and were quite small (< 20 cm). Large sized (> 20 cm) northern pikeminnows (n = 39) were measured for fork length (avg. 29.5 cm), but only for the first day of the event (Appendix 3). The derby coordinators were too busy on the second day, so no measurements were taken.

Gee Traps

Three Gee traps were set to capture juvenile fish on July 6. The traps were set overnight (Figure 2) for a minimum of 24 hours (Table 3). Two species of fish were captured: northern pikeminnows and redside shiners. Black spot disease was noted on many of the redside shiners.

Table 3. Gee trap results.

Trap #	Hours fished	Depth (m)	Substrate	Species	Number	Size Range (mm)
1	26.0	0.58	SWD[1]/organics	NSC	1	109
				RSC	47	68 - 112
2	24.0	0.62	SWD/organics and small cobble	NSC	1	128
3	24.0	0.60	organics and bryophyte plants	NSC	3	120 - 134
				RSC	5	65 - 82

[1]SWD = small woody debris

DRAINAGE AND HABITAT FEATURES

Heather Lake has one permanent inlet, one intermittent inlet, and one outlet. The permanent inlet is located on the northwest shore of the lake and was flowing at the time of survey. The intermittent inlet, which was not mentioned in the 1970 and 1989 lake reports, is located on the east shore and was not flowing during this survey. The outlet was flowing at the time of this survey and is located on the west shore.

The permanent inlet entering Heather Lake has many beaver dams on it. At approximately 100 m upstream from the mouth, there is the first small beaver dam. Fish still have access past this dam. In the next 20 m, there is a second beaver dam. This dam is not a barrier to fish migration. There is evidence of plants growing on the darn and no new sign of beaver cuttings. Upstream of this darn, there were about 30 northern pikeminnows observed (roughly 23 cm fork length). In addition, many small fry were present. At 220 m upstream from the mouth, there is a third small beaver dam. This dam is also not a barrier to fish migration. Up to this point, the stream substrate is primarily organics and affords no spawning potential for the stocked rainbow trout. Above the third beaver dam, spawning substrate is sparse but does afford some spawning potential. Overall, the water level in this stream is down (high water mark present) which possibly indicates that the outlet darn may have been breeched at some time in the past. At 250 m upstream from the mouth,

there is a small-unnamed lake. Our survey ended at this point. Upstream of this unnamed lake is Dina Lake #4. The distance from Dina Lake #4 and Heather Lake is about 1 km.

The intermittent inlet originates from a small pond. The pond is about 100 m long by 30 m wide. When the pond level rises, it spills into a small creek and flows into Heather Lake. The creek affords no fisheries values. The length of the creek is only 30 m. The height change of this creek is 3.43 m (11.4% gradient). Substrate in the creek is mud (soil) and tree roots. The wetted width appears to be 20 cm. There is some small amount of subterranean flow near the mouth.

A beaver dam (Plate 1) controls the water level in Heather Lake. The dam, 10 m long, is currently not a barrier to fish migration. Water is flowing through the dam in many different places. Evidence of past breeching of the dam was present. If the dam was to be breeched any further, the lake level would drop 33 cm. There was no sign of new beaver cuttings at the dam. Above the dam, many small (25 cm) sized fish were observed. A dead rainbow trout was observed trapped in the dam.

The outlet creek affords minimal spawning habitat for salmonids. Below the dam on the outlet, there was evidence of a high water mark indicating a drop in water level over time. The creek's wetted width ranged from 2.0 m to 2.5 m. The depth ranged from 20 cm to 30 cm. The flow was estimated at 0.3 m/s. At 30 m downstream from the mouth, some gravel is present. At 75 m downstream from the mouth, a second old beaver darn is present. This dam is overgrown with vegetation and is not a barrier to fish migration. Above this dam, 6 spawning condition rainbow trout (20 cm to 30 cm fork length) were observed. It is unknown if they had already spawned or were about to spawn. In addition, one small (15 cm) unidentified fish was seen. A drop in water level of 7 cm was noted at this location. A few short distances were observed where the creek did have some small gravel present. Below the second dam was a series of another set of beaver dams (2). Above each dam, the creek formed a small pond and had very little flow. The dams were about 10 m apart. These dams were small and do not appear to be barriers to fish migration. Overall, this outlet creek affords little salmonid spawning habitat.

The water level in Heather Lake appears to have dropped from when the lake was originally surveyed. According to the bathymetric map developed in 1970, Heather Lake contained two small islands at the south end of the lake. During the survey in 1998, these two islands now contain land in between them (Plate 2). The drop in water level has occurred between 1989 and 1998 as the map shown in the 1989-survey report indicates there still were two islands present. The land between the two old islands now contains sedge grass growing on it. The distance across this land is 60 m. The lake water

Plate 1: Photo of the outlet taken 25 m downstream of the lake looking upstream.

Plate 2: Photo looking south of the land now present between the two old islands.

level would have to rise 0.5 m to make this new land disappear and form the two islands again.

A peninsula is located on the south shore of the lake, just south of the island. The bathymetric map (1970) shows a piece of land protruding out towards the two islands. The 1989 map shows this same peninsula as two smaller pieces (one island and a smaller peninsula sticking out from shore). During the 1998 survey, this peninsula was comprised of only one piece of land (similar to the original 1970 map). Based on this information, it appears that the water level in 1989 had risen from the 1970 water levels. Now (1998), the water level has dropped below the level it was originally at in 1970. These fluctuations may be due to the creation and destruction of a beaver dam on the outlet stream over time.

BENCHMARK

The benchmark, located on the southeast shore, was not located by PWFWCP fish biologists during the 1998 survey (Figure 2). R. Jansson originally set this benchmark in 1970, 2.0 m above the lake water level. There is no mention of water levels in any of the survey reports conducted after that time on Heather Lake. PWFWCP fish biologists searched 800 m of the shoreline, but could not find the iron spike. The tree has either fallen down or fishermen may have removed the spike from the tree. Therefore, a new benchmark was created. The benchmark is now located 20 m south of the outlet. It is set 2.0 m above current water level (37 cm off of the ground). This benchmark is located in a 30 cm D.B.H. white spruce tree, 9.0 m from shore. The benchmark was painted orange. No reference to the past water levels can be made, although the high water mark appears to be about 40 cm above the current lake level at the time of this survey.

BIOLOGICAL ANALYSIS OF RAINBOW TROUT

A biological analysis was conducted on 5 of the 8 captured rainbow trout (Appendix 2). Two rainbow trout escaped the net (both were about 25 cm fork length) and one rainbow trout (14.5 cm fork length) was decomposed. Of the remaining five fish, three were females and two were males. Reproductive organ analysis revealed that two fish were immature, two fish were mature, and one was gravid. The gravid fish was a female full of eggs. The eggs weighed 52 g. Examination of stomach contents revealed two fish with empty stomachs. The other three fish had Dipterans, beetles, and terrestrial insects. External examination indicated healthy fish while internal examination revealed some tapeworms in the body cavity.

FISHERIES MANAGEMENT COMMENTS

Heather Lake supports a population of stocked rainbow trout; however the number of fish captured in the overnight net sets appear low for the number of fish stocked each year in the lake. In July 1998, the first net catch yielded 7 rainbow trout for a catch per unit effort of 0.32 rainbow trout per net-hour. Also in July 1998, the second net catch yielded 1 rainbow trout for a catch per unit effort of 0.07 rainbow trout per net-hour. In 1989, the net catch yielded 3 rainbow trout for a catch per unit effort of 0.14 rainbow trout per net-hour (McLean 1989). In addition, the 1984 stock assessment report indicated the netting effort revealed a poor capture rate for rainbow trout (0.11 rainbow trout per net-hour).

From these above results, it appears that the rainbow trout in Heather Lake are not doing well. Although it is unknown exactly why the rainbow trout are not thriving in Heather Lake, there are a few assumptions. The most logical explanation would be that the larger northern pikeminnows, and possibly bull trout, are heavily preying on the smaller stocked rainbow trout. The northern pikeminnows have a tendency to out-compete salmonids like rainbow trout in certain environments. In addition, the lake was stocked with 10,000 yearling rainbow trout on June 2, 1998 and none of these fish were captured in our netting survey held 5 weeks later. It is possible that the larger northern pikeminnows preyed upon these small rainbow trout, or a good portion of them, within this five-week period. Or, it may be possible that the stocked rainbow trout were too small at that time to be captured in the small panels of the gill net. This second explanation is more unlikely since small rainbow trout (especially of the 25 g size) will get captured in experimental nets.

The numbers of large sized northern pikeminnows captured in 1998 appear to be low. The netting efforts only captured 4 northern pikeminnows that were large enough to prey upon the smaller stocked rainbow trout. Stomach content analysis of these four fish revealed that they were either empty or the food was too far digested to be determined. The non-game fish derby only produced 39 of these same sized fish during the first day. Most of the fish captured at this derby were of the smaller size (not large enough to prey on the rainbow trout). It is possible that the derby has removed a portion of larger sized northern pikeminnows over time, and ultimately reduced the predation on the rainbow trout. However, this previous statement would be very difficult to prove with certainty.

Adequate spawning habitat appears to be limited for the rainbow trout in Heather Lake. The majority of the inlet stream from Heather Lake to the unnamed lake is covered in organics and has very little gravel for rainbow trout to spawn. The constant re-construction of beaver dams in this system make it hard for fish to migrate to their spawning grounds. Water levels in

the streams vary each year and may not contain adequate flows for rainbow trout to spawn.

Angling pressure on this lake for rainbow trout is present but the exact amount of use and their catch is unknown. Also, it is unknown if many people fish this lake during the winter season. A future creel survey would help define the angling pressure on Heather Lake, but probably is not warranted.

When the water temperature was high in July, it was presumed that many of the rainbow trout could inhabit deeper waters out of the reach of the first gill net set. Therefore, a second net was set down deep (23.1 m). When this net was pulled, there were no fish caught in the first three panels. One possible explanation may be that the oxygen levels down deep are poor for fish and is forcing most fish to inhabit shallower waters. This would result in increased competition for space and food resources between fish species. Further netting efforts in the summer months would be required to support this idea.

Other types of salmonids captured in the gill nets were: bull trout, lake whitefish, and mountain whitefish. Only one bull trout was captured and was still alive. Therefore, only a length was recorded and then the fish was released. The bull trout population in Heather Lake appears quite low based on the number of fish captured for the amount of netting effort that was applied. It is possible that even the few bull trout inhabiting Heather Lake are preying upon the smaller rainbow trout. Further studies are required to accurately determine the status of bull trout in Heather Lake. The whitefish species, although not studied completely, appear to be abundant and thriving in Heather Lake.

Heather Lake also supports populations of non-game fish including longnose suckers, northern pikeminnows, peamouth chub, redside shiners, and white suckers. Although not studied intensively, all of these populations were abundant and appear to be relatively healthy. Some of the smaller northern pikeminnows and most of the redside shiners did have evidence of black spot disease.

MISCELLANEOUS COMMENTS

1. Although not captured in any of the gill nets or Gee traps during 1998, 6 unidentified sculpins were observed near the boat launch area. The 1989 survey report indicated slimy sculpins were captured in the Gee traps.

2. Photographs were taken of some fish species and the surrounding habitat. Most photos were taken to document the change in features over time (i.e. habitat) and are not significant to the relevance of this report on fish

stocking. Therefore, these photos are not displayed in this fish stock assessment report but can be viewed at the PWFWCP address indicated at the beginning of this report.

3. The 1989 reconnaissance level survey indicated the presence of coarse suckers present in Heather Lake. In 1998, it was deemed that these fish were incorrectly identified, and were in fact white suckers.

4. The boat launch site does not show up on the 1970 bathymetric map. The UTM coordinates for this site is 10.484400.6149725 (NAD 1927). Picnic tables are located at the boat launch site and a single picnic table was found 125 m north of the old benchmark site (southeast shore).

5. Anecdotal information from a local resident indicated that a 1 kg rainbow trout was captured in the unnamed lake upstream of Heather Lake in 1997.

FISH STOCKING PROGRAM

The current rainbow trout stocking program in Heather Lake does not appear to be working and should be stopped. Based on the number of past stocking attempts in this lake, the rainbow trout are having trouble colonizing the lake. As a result, the stocking of Premier rainbow trout ceased in 1984. In 1989, the PWFWCP was looking for enhancement type projects. At that time, it was proposed to try and stock a different type of rainbow trout. The Blackwater strain was presumed a hardier fish that could avoid the larger northern pikeminnows when the rainbow trout are smaller. The Prince George Regional Fisheries Office accepted this concept. In 1992, the stocking program started up again, although the original (Premier) stain of rainbow trout was mistakenly stocked. In 1993, the problem was corrected and the right stain of rainbow trout (Blackwater) was stocked.

Our (PWFWCP) stocking assessment in 1998 revealed that the Blackwater strain of rainbow trout do not appear to thrive in the coarse fish environment of Heather Lake. As a result, the stocking of rainbow trout in Heather Lake should be ceased.

LITERATURE CITED

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Jesson, Duane A. 1990. Williston Lake enhancement project, small lake inventory and enhancement program. Executive summary of potential and realized enhancement projects resulting from lakes surveyed during 1989. Peace/Williston Fish and Wildlife Compensation Program. 5pp.

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APPENDIX 1

Netting Record

Lake: Heather

NETTING RECORD

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1 (July 6 and 7, 1998)

Type:	Sinking monofilament gill net		
Date Set:	July 6, 1998	Time:	1600 hrs
Date Lifted:	July 7, 1998	Time:	1400 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4m
Shallow Mesh Size:	25 mm	Depth: Substrate:	1.4 m veg./organics
Deep Mesh Size:	64 mm	Depth: Substrate:	12.0 m organics

Comments:

Set in the same location as the 1989 survey. Net was checked at 0945 hrs on July 7. Looked at the shallow end panels and it had 75 small fish (assumed to be northern pikeminnows) in it; therefore, left in to fish longer. Gill net #1 produced 73 northern pikeminnows, 22 white suckers, 15 mountain whitefish, 14 peamouth chub, 12 longnose suckers, 9 lake whitefish, 7 rainbow trout, 1 bull trout, and 1 redside shiner.

NETTING SITE #2 (July 9 and 10, 1998)

Type:	Sinking monofilament gill net		
Date Set:	July 9, 1998	Time:	1815 hrs
Date Lifted:	July 10, 1998	Time:	0945 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow Mesh Size:	25 mm	Depth: Substrate:	0.5 m cobble/organics
Deep Mesh Size:	64 mm	Depth: Substrate:	23.1 m organics

Comments:

Set in a deep part of the lake. Net was set overnight and then pulled the next morning. Gill net #2 produced 44 northern pikeminnows, 16 white suckers, 8 longnose suckers, 4 redside shiners, 3 lake whitefish, 3 peamouth chub, and 1 rainbow trout.

APPENDIX 2

Individual Fish Data

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 7, 1998
Gill Net #1

M - Male, F - Female, ? - Not Obvious
IMM - Immature, MG - Maturing, MT - Mature, GV - Gravid, SP - Spent, ? - Not Obvious
EG - Egg, ML - Milt, HD - Head, TG - Fish Tag, ST - Stomach
SC - Scale, FR - Fin Ray, OT - Otolith, WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
NSC	34.5	426	1.0374								?	unknown
NSC	40.6	681	1.0176								?	unknown
RB	21.8	111.8	1.0791	MT	F	3	Di.					lots
RB	24.5	157.4	1.0703	IMM	M	?						empty
RB	26.0	189.4	1.0776	MT	F	3						T.W., empty
RB	24.2	156.3	1.1028	IMM	M	3	Di.		beetle			
RB	37.1	498.1	0.9754	GV	F	4	Di.					eggs = 52 g.
MW	35.0	482			F							
MW	28.0	170			M							
MW	29.8	199			F							
MW	29.2	199			M							
MW	28.5	199			F							
MW	41.9	823			F							
MW	40.1	738			F							
MW	31.3	312			F							
MW	28.5	199			M							
MW	28.0	199			M							
MW	28.5	170			F							
MW	27.8	199			F							
MW	26.8	199			M							

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies(general)	Ca.	callibaetis
Le.	leeches						

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 7, 1998
Gill Net #1

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
MW	27.2	199			M							
MW	28.1	170			M							
LW	30.5	312			M							
LW	27.5	227			M							
LW	29.6	255			M							
LW	27.5	170			F							
LW	30.9	255			M							
LW	27.5	227			M							Parasites
LW	31.0	312			F							
LW	29.4	255			M							
LW	30.0	170			F							
PCC	28.5	199			M							
PCC	22.0	85			M							
PCC	21.0	85			M							
WSU	34.8											
WSU	38.5											
WSU	35.5											
WSU	32.2											
WSU	35.4											
WSU	34.0											

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 7, 1998
Gill Net #1

M - Male
F - Female
?- Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
?- Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
WSU	34.3											
WSU	35.6											
WSU	33.0											
WSU	33.4											
WSU	40.4											
WSU	38.2											
WSU	31.7											
WSU	31.9											
WSU	34.5											
WSU	35.6											
WSU	34.2											
WSU	37.0											
WSU	33.2											
WSU	32.2											
WSU	32.0											
WSU	34.4											
LSU	33.9											
LSU	33.5										breeding	colours
LSU	37.5											
LSU	34.0											

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	Callibaetis
Le.	leeches						

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 7. 1998
Gill Net #1

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
LSU	34.3											
LSU	33.5											
LSU	38.0											
LSU	29.6						black	spot	disease			
LSU	33.8											
LSU	34.0											
LSU	29.7											
LSU	37.2											
PCC	10.5											
PCC	14.3											
PCC	14.0											
PCC	10.9											
PCC	12.3											
PCC	13.3											
PCC	13.8											
PCC	11.5											
PCC	12.0											
PCC	11.5											
PCC	11.6											
RSC	9.5											

Other fish captured:

- 40 NSC - avg. 130 mm, min. 115 mm, max. 150 mm, plus 30 NSC of the same size escaped the net.
- 2 RB fell out of the net - roughly 25 cm fork length, 1 BT was released alive - 38.2 cm fork length.

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 10. 1998
Gill Net #2

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
LSU	32.6											
LSU	34.5											
LSU	34.1											
LSU	39.0											
LSU	38.2											
LSU	40.0											
WSU	34.0											
WSU	32.5											
WSU	34.3											
WSU	32.5											
WSU	34.4											
WSU	34.3											
WSU	38.0											
WSU	40.5											
WSU	33.6											
WSU	32.4											

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 10, 1998
Gill Net #1

M - Male, F - Female, ? - Not Obvious
IMM - Immature, MG - Maturing, MT - Mature, GV - Gravid, SP - Spent, ? - Not Obvious
EG - Egg, ML - Milt, HD - Head, TG - Fish Tag, ST - Stomach
SC - Scale, FR - Fin Ray, OT - Otolith, WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
WSU	32.5											
WSU	33.7											
WSU	33.2											
WSU	33.3											
WSU	34.1											
NSC	35.4	539	1.2150									empty
NSC	36.7	482	0.9751								?	unknown
NSC	12.5											
NSC	13.3											
NSC	13.5											
NSC	14.2											
NSC	13.1											
NSC	12.6											
NSC	13.5											
NSC	13.9											
NSC	13.8											
NSC	14.1											
NSC	13.5											
NSC	13.9											

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 10, 1998
Gill Net #1

Vl - Male	IMM - Immature	EG - Egg	SC - Scale
F - Female	MG - Maturing	ML - Milt	FR - Fin Ray
? - Not Obvious	MT - Mature	HD - Head	OT - Otolith
	GV - Gravid	TG - Fish Tag	WF - Whole Fish
	SP - Spent		
	? - Not Obvious	ST - Stomach	

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
NSC	12.5											
NSC	13.2											
NSC	14.2											
NSC	13.4											
NSC	13.1											
NSC	13.0											
NSC	12.7											
NSC	14.0											
NSC	12.5											
NSC	12.4											
NSC	13.0											
NSC	13.6											
NSC	14.1											
NSC	14.0											
NSC	12.6											
NSC	12.3											
PCC	12.2											
PCC	16.4											
PCC	16.3											

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 10, 1998
Gill Net #2

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
LW	29.9	199										
LW	28.2	255										
RSC	10.2						black	spot	disease			
RSC	11.5											
RSC	11.7											
RSC	10.4											
RB	14.5	?	?	?	?	?						decomposed

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Other fish captured:

- 2 LSU released alive (37.0 cm and 39.0 cm fork length).
- 1 WSU released alive (37.0 cm fork length).
- 14 NSC escaped the net, average size is about 135 mm fork length, black spot disease.
- 1 LW escaped the net.

AGE DETERMINATION COMPLETED BY:

North/South Consultants
Don Macdonel and Paul Graveline
2nd Floor, 1475 Chevrier Blvd.
Winnipeg, Manitoba, R3T 1Y7

APPENDIX 3

Non-Game Fish Fishing Derby Data

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 11, 1998
Fishing Derby Data
Angled

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
NSC	36.0											
NSC	34.0											
NSC	30.0											
NSC	28.5											
NSC	26.5											
NSC	28.5											
NSC	27.0											
NSC	26.5											
NSC	37.5											
NSC	32.5											
NSC	28.0											
NSC	25.0											
NSC	30.5											
NSC	28.0											
NSC	25.5											
NSC	26.5											
NSC	23.5											
NSC	24.0											
NSC	28.0											
NSC	26.0											

Lake: Heather

INDIVIDUAL FISH DATA

Date Captured: July 11. 1998
Fishing Derby Data
Angled

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
NSC	25.0											
NSC	23.0											
NSC	20.5											
NSC	25.5											
NSC	28.0											
NSC	23.5											
NSC	21.5											
NSC	41.0											
NSC	42.0											
NSC	32.0											
NSC	33.0											
NSC	33.0											
NSC	31.0											
NSC	29.O											
NSC	31.0											
NSC	30.0											
NSC	35.0											
NSC	31.0											
NSC	44.0											
Sucker	31.0											

- Average fork length for the 39 northern pikeminnows is 29.5 cm.